

24-58 3-17/38

The Phenomenon of "Super-Plasticity" in the System Aluminium-Copper.

alloys. Indeed, during systematic investigation of the plasticity as a function of the temperature of aluminium alloys containing various grades of copper, the effect of "super plasticity" was detected for the eutectic alloy (33.1% Cu). For preparing the experimental alloys, commercially pure aluminium Grade A-1 was used and cathodic MO copper; the alloys were prepared in a laboratory resistance furnace and were cast into a graphite mould. From the thus produced lengths, specimens with an active part of 5 mm dia, 20 mm length, were machined. The specimens were tested in static and dynamic tension. The temperature measurements during the investigations were effected by chromel-alumel thermocouples, the hot joint of which was fixed on to the specimen, screened by an aluminium foil for reducing the errors in determining the temperature caused by the differences between the optical properties of the specimen and the hot joint of the thermocouple. The specimen was held at the test temperature for 15 min prior to fracturing. As a measure of the plasticity, the magnitude of the total relative contraction,  $\phi\%$ , was chosen; for comparing the plasticity of

Card 2/4

24-58-3-17/38

The Phenomenon of "Super-Plasticity" in the System Aluminium-Copper.

the specimens which showed "super plasticity" properties, it proved more convenient to apply the magnitude of the full relative elongation  $\delta\%$ . The plasticity of the alloys was determined at various temperatures,  $T^{\circ}\text{C}$ , at steps of  $50^{\circ}\text{C}$  from room temperature to the fusion temperature. After  $500^{\circ}\text{C}$  the eutectic alloy was investigated at 515, 525, 535 and  $540^{\circ}\text{C}$ . The results of these investigations, i.e. the breaking strength  $\sigma_B$ ,  $\text{kg/mm}^2$ , are entered in the table, p.121 ( $T^{\circ}\text{C}$ ; specimen number;  $\phi\%$ ;  $\delta\%$ ,  $\sigma_B$ ,  $\text{kg/mm}^2$ ). For

static tension in the as-cast state, the eutectic alloy had a brittle fracture up to  $400^{\circ}\text{C}$  with a high strength value ( $\sigma_B$  from 21-22  $\text{kg/mm}^2$ ). For  $400^{\circ}\text{C}$  a sharp transition into the plastic state was observed ( $\phi = 40\%$ ). Further increase in the test temperature has revealed extremely high plasticity indices and a sharp drop in strength. At  $500^{\circ}\text{C}$ ,  $\phi$  reached 100%,  $\delta$  being 160%; thereby the strength until the effect of "super-plasticity" occurred amounted to 4.7  $\text{kg/mm}^2$ . Following that, the strength dropped sharply to zero and further stretching of the specimen proceeded at a load which could not be measured with the applied equipment.

Card 3/4 As can be seen from the table, the effect of "super-plasticity"

24-58-3-17/38

The Phenomenon of "Super Plasticity" in the System Aluminium-Copper.

was also observed at high temperatures. For comparison with the plasticity of the eutectoidal alloy, Fig.1 gives curves characterising the change in the plasticity with temperature with pure aluminium and of alloys containing 2.6 and 6.28% Cu. It can be seen therefrom, and also from the plasticity isotherms corresponding to 500°C and given in Fig.2 (curve 1, alloys as cast; curve 2, homogenized alloys), that other alloys of this system did not show this particular state under similar conditions. Investigation of the eutectic alloy in the homogenized state has not shown any "super-plasticity" characteristics. The revealed "super-plasticity" phenomenon in the Al-Cu system of the cast eutectic alloy in the neighbourhood of the solidus temperature is probably associated with a partial hardening of the alloys during casting, with a particular structural state of the eutectic and with temperature caused changes of the solubility of Cu and Al in the solid state which takes place in the Al angle of the Al-Cu diagram. (This is a complete translation except for references). There are 2 figures, 1 table and 3 Soviet references.

SUBMITTED: June 21, 1957.

Card 4/4

1. Aluminium copper alloys--Plasticity

CHERVYAKOVA, V.V.  
P.2

2(0)

PHASE I BOOK EXPLOITATION

SOV/2338

Akademiya nauk Kazakhskoy SSR. Institut yadernoy fiziki

Trudy/Labratoriya metallovedeniya i fiziki matallov/, tom 2 (Transactions of the Institute of Nuclear Physics, Kazakh S.S.R. Academy of Sciences /Laboratory for Metallurgical Science and Physics of Metals/, Vol 2) Alma-Ata, Izd-vo AN Kazakhskoy SSR, 1959. 169 p. 1,000 copies printed.

Ed.: F. Ya. Osadchiy; Tech. Ed.: P.F. Alferova; Editorial Board: I.G. Grinman, L.I. Dautova, I.G. Dem'yanikov, D.K. Kaipov (Resp. Ed.), S.K. Kalinin, A.A. Presnyakov, and Zh. S. Takibayev.

PURPOSE: This is a collection of articles intended for research scientists, factory laboratory personnel, engineers, technicians, and also students and Aspirants in metallurgy and physics of metals.

COVERAGE: The collection contains research reports which investigate the dependency of alloy properties on their chemical and phase states in a wide range of temperatures down to melting point and set forth much factual material on

Card 1/5

Transactions of the Institute Of Nuclear (Cont.)

SOV/2838

aluminum, copper, nickel, and other alloys. Theoretical ideas on plasticity and superplasticity, which are described as new, and hypotheses on reasons for the lowered plasticity of solid solutions are propounded on the basis of experimental data. No personalities are mentioned. References are given at the end of each article.

TABLE OF CONTENTS:

Presnyakov, A.A., and <u>V.V. Chervyakova.</u> The Plasticity of Some Aluminum Base Alloys	3
1. Plasticity and strength of Al-Cu alloys	3
2. Plasticity and strength of alloys of the Al-Si system	9
3. Plasticity and strength of alloys of the Al-Zn system	14
Presnyakov, A.A., and <u>V.V. Chervyakova.</u> The Problem of "Superplasticity" in Alloys	30
Presnyakov, A.A., and A.V. Novikov. Study of the Mechanical Properties of Bronzes With Zinc, Phosphorus, Lead, and Nickel Additives	41

Card 2/5

Transactions of the Institute of Nuclear (Cont.)	SOV/2838
1. Study of the microhardness of bronzes	41
2. Change in plasticity and strength of bronzes with phosphorous, zinc, nickel, and lead additives during static loading	48
3. The aging of Sn-P and Sn-Zn-Pb bronzes	59
Presnyakov, A.A., and U.K. Duysemaliyev. Plasticity of Some Copper-Nickel and Nickel Alloys During Dynamic Loading	74
Presnyakov, A.A., and N.S. Sakharova. Investigation of Some Tin Base Alloys	78
Presnyakov, A.A., and Yu.F. Klyuchnikov. Fine Crystal Structure and the Properties of Nonferrous Metal Alloys	85
1. Fine crystal structure and properties of alloys of the Cu-Ni system	85
2. Fine crystal structure and the properties of simple bronzes	89
Presnyakov, A.A. Reasons for the Decrease in Plasticity of Solid Solutions	95
Card 3/5	

Transactions of the Institute of Nuclear (Cont.)	SOV/2838	
Presnyakov, A.A. The Relationship of Plasticity to Microstructure and Phase Composition in Alloys		101
Novikov, I.I., and K.T. Chernousova. Mechanical Properties of Al-Sn Alloys in the Liquid-Solid [Semi-liquid] State		109
Novikov, I.I., and K.T. Chernousova. The Influence of Iron, Silicon and Manganese Admixtures on the Hot Shortness and Mechanical Properties of Al-Cu Alloys Near the Solidus Point		112
Novikov, A.V., and M.I. Tsypin. The Temperature Coefficient of Electrically Resistant Manganin Alloys		119
Tsypin, M.I. One Method of Preparing Electron Microscope Specimens		124
Presnyakov, A.A., V.V. Bukin, and Yu. P. Mironenko. Determination of Mean Specific Pressures During the Hot Rolling of Alloys and Nonferrous Metals		129
Card 4/5		

Transactions of the Institute of Nuclear (Cont.)	SOV/2838
Presnyakov, A.A. On the Peculiarities of "Plastic Friction"	139
Presnyakov, A.A., and N.S. Sakharova. The Structure of Zinc Base Alloys	146
Novikov, A.V., M.I. Tsypin, and L.P. Fridman. The Problem of Liquation Phenomena in Ingots of Bronze OTsS 4-4-2.5	151
Pashevkin, B.P. The Structural Nature of the Influence of Three Elements During the Spectral Analysis of Silicon Bronze	153

AVAILABLE: Library of Congress

Card 5/5

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1-22-60



CHERNYAKOVA, V.V., Cand Tech Sci (dis.) "Study of <sup>the</sup> plasticity  
of aluminum alloys ~~as a function of~~ composition and temperature."  
Mos, 1959. 15 pp (Min of Higher Education USSR. Krasnoyarsk Inst  
of Non-Ferrous Metals in V.I. Yalishin), 150 copies (ML, 87-59,189)

- 52 -

PRESNYAKOV, A.A.; CHERVYAKOVA, V.V.

Plasticity of some aluminum alloys. Trudy Inst. iad. fiz. AN  
Kazakh. SSR 2:3-29 '59. (MIRA 13:3)  
(Aluminum alloys) (Plasticity)

PRESNYAKOV, A.A.; CHERVYAKOVA, V.V.

Superplasticity of alloys. Trudy Inst. iad. fiz. AN Kazakh. SSR  
2:30-40 '59. (MIRA 13:3)  
(Alloys) (Plasticity)

78.8200  
18.1210

SOV/126-8-1-16/25<sup>66898</sup>

AUTHORS: Presnyakov, A.A. and Chervyakova, V.V.

TITLE: On the Question of "Super-Plasticity" of Alloys

PERIODICAL: Fizika metallov i metallovedeniye, 1959, Vol 8, Nr 1,  
pp 114-121 (USSR)

ABSTRACT: In the present paper a few data on super-plasticity obtained as a result of systematic study of the influence of temperature on the plasticity of aluminium alloys are given. The effect of super-plasticity was first noticed by the authors in a cast eutectic Al-Cu alloy (33% Cu), when it was statically strained at 500°C and above (Ref 5). Testing this alloy in its homogenized and quenched condition, as also cast specimens under dynamic loading conditions, did not bring to light any signs of this effect. The photomicrographs of the eutectic alloy shown in Figs 1 and 2 give an idea of the coarse structure of the cast eutectic, which is characterized by a needle-like structure of plates which are elongated towards the centre of the billet (Fig 1a), and of the finely crystalline even structure of the same alloy after homogenization (Fig 2). In order to expose the nature of the microfracture at the moment of deformation when

Card 1/5

66898

SOV/126-8-1-16/25

On the Question of "Super-Plasticity" of Alloys

the alloy exhibits super-plasticity, a microsection of the cast billet was heated to 525°C, soaked at this temperature for 15 minutes and quenched. As a result of such treatment the needle-like grains have lost their distinct cast shape and texture in isolated places (Fig 1b), although the general nature of the coarse structure has remained unchanged. It must be noted that subsequent polishing of this section for 3-5 minutes has strongly changed the microstructure of the alloy (Fig 1, 8-2). A partial decomposition has occurred: a precipitate of the secondary phase can be seen along the boundaries of the needle-like grains. In some places the boundaries of the former needles can be seen (Fig 18) and in others (Fig 12), where even before polishing the cast orientation had disappeared on heating, no traces of the former coarse structure have remained. The photomicrograph in Fig 3a is characteristic of the structure of the same alloy after straining at 525°C (one of the temperatures at which super-plasticity has been observed). The highly dispersed, very even structure gives an idea of the deep changes in the structure of the alloy which have occurred during the deformation process. The microstructure of the

Card 2/5

18

66898

SOV/126-8-1-16/25

On the Question of "Super-Plasticity" of Alloys

homogenized eutectic, as also of the quenched one, has remained completely unaltered after deformation (Fig 2a), and the plasticity has not exceeded the usual values (Ref 5). In Fig 4a the microstructure of the Al-Cu eutectic cast on a polished surface (without polishing and etching) is shown. Fig 4b is an X-ray photograph of the cast Al-Cu eutectic. In the study of the Al-Zn system, alloys were tested, the zinc content of which is given in the table on p 116. The method used for the preparation and testing of Al-Zn specimens was the same as that for Al-Cu alloys. The following heat treatment was adopted: homogenization at 400°C (except alloys 82-95) for 168 hours. The alloys 82-95 were soaked for the same length of time at 360°C. Quenching was carried out from 400, 375 and 300°C (2 hours' soaking) in iced water. Alloys containing from 71-88% zinc, tested in the quenched condition, were found to be super-plastic. In Fig 5 isotherms of plasticity of Al-Zn alloys in relation to the zinc concentration, tested as quenched from 375°C, are shown. Fig 6a shows the microstructure of an Al-Zn

Card 3/5

4

66892

SOV/126-8-1-16/25

On the Question of "Super-Plasticity" of Alloys

alloy containing 80% Zn and quenched from 375°C; Fig 6b is the microstructure of the same alloy heated (after quenching from 375°C) to 250°C and soaked at that temperature for 15 minutes; and Fig 6β is the microstructure of the same alloy after deformation at 250°C in the as-quenched condition, etched in 20% NaOH solution. In Fig 7 the change in strength in relation to temperature of a few alloys of the Al-Zn system, tested in the quenched condition, is shown: 1 - 71% Zn; 2 - 76% Zn; 3 - 80% Zn. The results of the investigation of the systems Al-Cu and Al-Zn have shown that the conditions necessary for a super-plastic state to arise are metastability in the whole mass of crystallites of the investigated alloy, and a deformation rate equal to the rate of their decomposition at sufficiently high temperatures to ensure the required atomic mobility. Data on super-plasticity obtained by the authors as a result of their systematic investigation of aluminium alloys lead to the conclusion that this phenomenon is associated with a condition of the crystal lattice of the alloy and definite processes within it occurring as

Card 4/5

66898

SOV/126-8-1-16/25

On the Question of "Super-Plasticity" of Alloys

a result of temperature changes and stress applications.  
There are 7 figures, 1 table and 14 references, 9 of  
which are Soviet, 4 German and 1 English.

ASSOCIATION: Akademiya nauk Kazakhskoy SSR  
(Academy of Sciences of the Kazakh SSR)

SUBMITTED: July 30, 1957 (Initially)  
May 25, 1958 (After revision)

4

Card 5/5



80985

1210

S/180/60/000/03/017/030

E193/E383

AUTHORS: Presnyakov, A.A. and Chervyakova, V.V. (Alma-Ata)

TITLE: On Super-ductility of the Aluminium-Zinc Alloys of the Eutectoid Composition

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1960, Nr 3, pp 92 - 98 + 1 plate (USSR)

ABSTRACT: The present paper describes the results of a systematic study of the effect of the composition and thermal history of the aluminium-zinc alloys on their ductility at various temperatures. Maximum ductility was observed in the 80% Zn-Al alloy, quenched from 400 °C and tested at 275 °C; elongation of 628% was obtained in this case, with the test piece still unbroken owing to the limitations imposed by the dimensions of the testing equipment. No super-ductility was observed in test pieces, quenched from temperatures below 275 °C or tested at temperatures above the temperature of the eutectoid transformation. Only alloys containing between 71.6 and 88.0% Zn were capable of displaying super-ductility and although the effect was observed in specimens quenched from any temperature above 275 °C, the higher the quenching temperature the higher

Card1/4

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E193/E383

On Super-ductility of the Aluminium-zinc Alloys of the Eutectoid Composition

was the degree of super-ductility. The variation of strength of the quenched specimens in the super-ductile condition differed considerably from that of other alloys of the system. In the moment immediately preceding the onset of super-ductility, the load carried by the test piece was small but measurable; further deformation of the specimen took place under a load so small that it could not be measured by the equipment employed in the experiments. The results of X-ray diffraction analysis of a series of Zn-Al alloys, subjected to various heat treatments, showed that the onset of super-ductility is accompanied by far-reaching changes in the crystal lattice. The character of these changes correlated with the results of microhardness measurements and theoretical considerations led the present authors to the conclusion that the process of stabilization of the metastable structure formed as a result of spontaneous decomposition of the  $\beta_2$  solid solution play a predominant part in the phenomenon of

Card2/4

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E193/E383

On Super-ductility of the Aluminium-Zinc Alloys of the Eutectoid Composition

super-ductility, observed in the Zn-Al alloys. This view is supported by the following facts: 1 - no super-ductility is displayed in the absence of metastable condition, associated with the eutectoid transformation, i.e. in the alloys quenched from below 275 °C; 2 - no super-ductility is observed in specimens quenched from temperatures higher than 275 °C and tested at temperatures above 300 °C; 3 - the degree of super-ductility increases with rising quenching temperature, this effect being obviously associated with the higher degree of metastability and consequently with a higher intensity of the diffusion processes; 4 - the phenomenon of super-ductility is not observed in homogeneous alloys that have attained the state of equilibrium; 5 - the degree of super-ductility depends on the quantity of the phase taking part in the stabilizing processes; the alloys of the eutectoid and near-eutectoid composition consist almost exclusively of such an "active" material; the further away from the eutectoid is the composition of an alloy, the larger proportion of the "inert"

Card3/4

4

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E193/E383

On Super-ductility of the Aluminium-zinc Alloys of the Eutectoid Composition

material it contains and when a certain critical content of the inert material is reached, the alloy loses its super-ductile properties. Since super-ductility in certain Al-Zn alloys is associated with the condition of and the phenomena taking place in the crystal lattice at elevated temperatures in the presence of externally applied stresses it must be concluded that not only the boundary regions of the interacting phases but the whole volume of the crystal takes place in the processes associated with super-ductility. There are 5 figures, 2 tables and 17 references, 11 of which are Soviet, 4 German and 2 English.

SUBMITTED: March 2, 1959

Card 4/4

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*CHERVYAKOVA, V.V.*

82644

18-8200

S/126/60/010/02/016/020

E073/E335

AUTHORS: Presnyakov, A.A. and Chervyakova, V.V.

TITLE: On the Nature of Plasticity Minima in Solid Solutions<sup>18</sup>

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol. 10,  
No. 2, pp 291 - 293

TEXT: On the basis of earlier work (Refs. 1-8), the authors express the view that occurrence of sharp drops (minima) in plasticity are due to diffusion processes which accompany deformations and cause additional distortions and defects, resulting in an increase in strength. The experimental data on plasticity and strength anomalies for a number of brasses are graphed in Figs. 1 and 2. For all these alloys a deviation of the strength indices is observed in the temperature range which corresponds to the plasticity minimum whereby for one of the alloys there is one strength anomaly, whilst in three other alloys two strength anomalies were observed. The point of transition from one anomaly to the other coincides in all cases with the minimum of the drop in plasticity. It is obvious that this coincidence is not accidental. The anomalous change in the strength in this range

Card 1/2

82644

S/126/60/010/02/016/020

E073/E335

On the Nature of Plasticity Minima in Solid Solutions

is between 4 and 5 kg/mm<sup>2</sup>, i.e. about 20-50% of the measured value, which is considerably greater than possible experimental errors. The authors consider that the experimental results fully confirm their earlier expressed theoretical views. They believe that further experiments will be necessary to elucidate fully the obtained experimental results..

There are 2 figures and 9 Soviet references.

ASSOCIATION: Institut yadernoy fiziki AN KazSSR  
(Institute of Nuclear Physics of the Ac.Sc. KazSSR)

SUBMITTED: March 19, 1960

Card 2/2

PRESNYAKOV, A.A.; CHERVYAKOVA, V.V.; NOVIKOV, A.V.; KLYUCHNIKOV, Yu.F.

Role of lead in leaded brass. TSvet. met. 33 no.7:77-81 J1 '60.  
(Brass--Metallurgy) (Lead)

CHERVYAKOVA, VV.

PHASE I BOOK EXPLOITATION

SOV/5690

Akademiya nauk Kazakhskoy SSR. Institut yadernoy fiziki.

Metallovedeniye i obrabotka metallov davleniyem (Physical Metallurgy and Pressworking of Metals) Alma-Ata, 1961. 183 p. (Series: Trudy Instituta yadernoy fiziki, t. 4) 2,450 copies printed.

Resp. Eds.: I. G. Grinman and A. A. Presnyakov; Resp. Secretary: V. V. Chervyakova;  
Eds.: M. Ya. Brailovskaya and T. I. Shevchuk; Tech. Ed.: Z. P. Rorokina.

PURPOSE: This book is intended for scientific research workers, technical personnel in industry, and students and aspirants interested in problems of physical metallurgy and the pressworking of metals.

COVERAGE: The book, Volume IV of the Transactions of the Institute of Nuclear Physics, Academy of Sciences Kazakh SSR, contains papers reviewing problems of physical metallurgy. Attention is given to a consideration of metal ductility, strength, phase transformation, and the ordering of various alloys, and to a discussion of the diffusion mechanism of the plasticity. Experimental findings concerning strength, deformation, and external friction in the working of non-ferrous metals and alloys are included in papers dealing with metal rolling.

Card 1/6



Physical Metallurgy and Pressworking of Metals

SOV/5690

Problems of automatic inspection and control of multidraft wire-drawing frames are also considered. Most of the papers are accompanied by references, the majority of which are Soviet.

TABLE OF CONTENTS:

Kirillov, P. G. On the Problem of the Deformation Mechanism of Metallic Solids	3
Chernousova, K. I., and A. A. Presnyakov. On the Question of the Ductility of Copper-Aluminum Alloys	9
Presnyakov, A. A., V. V. Chervyakova, and K. K. Kasymbekova. On the Problem of the Nature of Ductility Downfall in Aluminum Alloys	15
Presnyakov, A. A., and V. V. Chervyakova. On the Superductility of Eutectoid Aluminum-Zinc Alloys	23
Starikova, G. V., and A. A. Presnyakov. On the Abnormal Increase of Ductility of $\alpha + \beta$ -Brasses	33

Card 2/6

Physical Metallurgy and Pressworking of Metals

80V/5690

Starikova, G. V., and A. A. Presnyakov. Investigating the Ductility of $\beta$ -Brass	39
Presnyakov, A. A., and L. I. Dautova. On the Problem of Polymorphism of Zinc	42
Presnyakov, A. A. and L. I. Dautova. On the Nature of Cold-Shortness in Metals and Alloys	48
Presnyakov, A. A. On the Causes of the Anomalies in the Ductility of Metal Alloys	53
Presnyakov, A. A., L. I. Dautova, and Yu. F. Klyuchnikov. Concerning Some Special Features of the Changes in the Microhardness and Crystal Structure of Brass	63
Presnyakov, A. A., L. I. Dautova, and Yu. F. Klyuchnikov. On the Anomalies in the Electrical Resistance of Brasses and Aluminum Bronzes	69

Card 3/6

Physical Metallurgy and Pressworking of Metals

SOV/5690

Klyuchnikov, Yu. F., and A. A. Presnyakov. Anomalies in the Electrical Resistance of the Cu-Ni Alloys	74
Nysanbayev, G. N., and A. A. Presnyakov. On the Effect of the Crystallization Rate on the Structure and Properties of Commercial-Grade Metals	78
Presnyakov, A. A., Yu. A. Gorhan', and V. V. Chervyakova. Concerning the Equilibrium Diagram of the Al-Zn Alloy	85
Chernousova, K. T., and A. A. Presnyakov. The Effect of Vanadium on the Structure and Properties of Copper-Base Alloys	89
Mironenko, Yu. P. The Use of Wound Transducers in Strain Gages	95
Presnyakov, A. A., and A. A. Vinnitskiy. On the Method of Determining the External-Friction Coefficient by Conical [Hammer] Heads	97
Presnyakov, A. A., and A. A. Vinnitskiy. The Method of Determining the Friction Unit Forces in Metal Rolling	100

Card 4/6

Physical Metallurgy and Pressworking of Metals

Sov/5690

Vinnitskiy, A. A., and A. A. Presnyakov. On the Problem of Unused Friction Forces in Metal Rolling	102
Presnyakov, A. A. Concerning the Dependence of Rupture Strength on Temperature	107
Presnyakov, A. A. On the Problem of the Diffusion Mechanism of Plastic Deformation	111
Vinnitskiy, A. A., and A. A. Presnyakov. Experimental Determination of Friction Coefficients in Flattening	116
Grinman, I. G., A. G. Yegay, L. S. Mikhaylova, and Yu. V. Ovsov. Objectives of Automatic Inspection and Control in the Wire-Drawing Process	122
Grinman, I. G., and E. K. Dzhasybekova. Investigating the Possibility of Measuring by Radioactive Radiation the Temperature of the Wire During Drawing	126

Card 5/6

Physical Metallurgy and Pressworking of Metals

80V/5690

- Grinman, I. G., and L. P. Pushkarev. On the Frequency Method of Measuring the Backpull of a Wire During Drawing 132
- Grinman, I. G., Yu. V. Ovsov, V. S. Mishchenko, and Sh. Bakhtayev. Photoelectric Micrometer for Gaging the Diameter of Moving Wires or Threads 138
- Grinman, I. G., and L. S. Mikhaylova. On the Automatic Measuring of the Wire Velocity and Footage During Drawing 147
- Yegay, A. G. Reactor Starting [and Acceleration] of the Wound-Rotor Electric Motor With Up to 100 kw Capacity by Using Electromagnets of the MO 300B PV 40% 220v Type 151
- Malakhov, Yu. I., Study of the Automatic Electronic Drive of a Wire-Drawing Frame 158
- Grinman, I. G., and N. I. Sakhapov. On the Automatic Electric-Simulator Control of Wire-Drawing Frames 172

AVAILABLE: Library of Congress

Card 6/6

VK/wrc/mas  
11-22-61

PRESNYAKOV, A.A. (Alma-Ata); STARIKOVA, G.V. (Alma-Ata); SAMOYLOV, V. A.  
(Alma-Ata); CHERVYAKOVA, V.V. (Alma-Ata)

Superplasticity of cast metastable eutectics. Izv.AN. SSSR. Otd.  
tekh. nauk. Met. i topl. no.2:146-147 Mr-Apr '61. (MIRA 14:4)

1. Institut yadernoy fiziki AN KazSSR.  
(Nonferrous alloys--Metallography) (Eutectics)

PRESNYAKOV, A.A.; DUYSEMALIYEV, U.K.; CHERVYAKOVA, V.V.

Effect of small amounts of addition alloys on the serviceability of  
LS59-1 brass. Izv. AN Kazakh. SSR. Ser. met., obog. i ogneup. no.3:  
99-104 '61. (MIRA 15:1)

(Brass--Metallurgy)

36809

3/135/62/000/004/095/201  
A052/A101

18.1210 (2408)

AUTHORS: Presnyakov, A. A., Chervyakova, V. V., Kasymbekova, K. K.

TITLE: On the problem of the nature of ductility dips with aluminum alloys

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 4, 1962, 25, abstract 4I146  
("Tr. In-ta yadern. fiz. AN KazSSR, no. 4, 1961, 15-22)

TEXT: In order to establish a connection of ductility dips with diffusion processes, alloys of Al with 0.8, 2.6 and 4% Cu were investigated. The samples were subjected to static tension and  $\psi$  was determined as a function of the time of diffusion annealing, hardening temperature, duration of the exposure to different testing temperatures and the rate of heating. It is established that the aging causes the appearance of dips on the ductility curve. Only in the case of diffusion-annealed samples (during 168 hours at 520°C) and cooled at a rate of 3 degree/min no ductility dip was observed. Thus the disappearance of the dip is connected with the absence of aging with an alloy in the state of maximum equilibrium. In a hardened state the alloys prove to be most ductile and the dip in the region of 100°C is the least developed. An increase of hardening temperature from 250 to 350°C causes a sharp increase of  $\psi$ . On transition to

Card 1/2



S/135/62/000/004/095/201  
A052/A101

On the problem of the nature ...

hardening temperatures of 500 - 570°C a further increase of ductility is observed. The effect of recrystallization was studied on Al-Cu alloys with 0.8, 2.0, 6.1% Cu and on silumins with 0.45, 1.1, 3.3, 6.7, 11.7 and 18% Si and also on commercial Al. After a cold deformation by 50%, hollow cylinders for X-ray diffraction study were turned of blanks. The back radiography was performed in the temperature chamber. The experiments were carried out up to 200 and > 300°C every 50° and in the range of 200 - 300°C every 20°. The radiograms were processed photometrically to determine the width and intensity of the lines. The beginning of recrystallization was determined from the emergence of isolated spots. In Al-Cu alloys the beginning of recrystallization was registered at 220 - 260°C, in the Al-Si system the beginning of recrystallization spreads over the range of 220 - 350°C. An increase of the Si content to 3.3% reduces sharply the number of spots. In the Al-Cu system a fairly good coincidence between the maximum intensity temperature of development of recrystallization processes with the zone of a sharp decrease of ductility characteristics is observed. In the case of silumins a shift over the temperature scale of the range of the most intensive development of the recrystallization process is observed depending on the composition. There are 11 references.

M. Matveyeva

[Abstracter's note: Complete translation]

Card 2/2

36812

S/137/62/000/004/100/201  
A052/A101

18. 2200

AUTHORS: Presnyakov, A. A., Chervyakova, V. V.

TITLE: On superductility of eutectoid Al-Zn alloys

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 4, 1962, 29, abstract 4I167  
("Tr. In-ta yadern. fiz. AN KazSSR", no. 4, 1961, 23-32)

TEXT: The changes of crystalline lattice accompanying the phenomenon of "superductility" were studied by the X-ray diffraction method. The radiograms were taken by Doby camera and in a camera with a flat cassette in Cu-K $\alpha_1$ -radiation with Ni-filter. The radiograms were processed photometrically, the parameter was calculated from the 333 and 224 lines. The results of the measurement have shown that the lattice parameter of the  $\beta_1$ -phase of the Al-Zn alloy depends on the state of the alloy; its maximum value is registered with a freshly hardened alloy and the minimum one with a slow-cooled alloy. The main part in the origin of superductility in Al-Zn systems is played by the processes of the final stabilization of the metastable structure, which arises as a result of a spontaneous decomposition of  $\beta_2$ -solid solution. The phase lattices are

Card 1/2

On superductility of eutectoid Al-Zn alloys

S/137/62/000/004/100/201  
A052/A101

highly distorted at a spontaneous decomposition of  $\beta_2$ -solid solution, which is probably the reason for a sharp decrease of solubility of components in a hardened alloy. There are 18 references.

M. Matveyeva

[Abstracter's note: Complete translation]

Card 2/2

36801

9/137/62/000/004/084/201

A052/A101

18.1270

AUTHORS: Presnyakov, A. A., Gorban', Yu. A., Chervyakova, V. V.

TITLE: On the constitution diagram of Al-Zn

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 4, 1962, 9, abstract 4161  
("Tr. In-ta yadern. fiz. AN KazSSR", no. 4, 1961, 85 - 88)

TEXT: The constitution diagram of the Al-Zn system in the range from 60 to 80% Zn was studied with the purpose of its closer specifying. As initial materials Al of A00 (A00) grade and Zn of 4B (Tsv) grade were taken. After casting into a graphite mold the alloys were homogenized during 168 hours at 350°C, deformed by 50%, annealed two hours at 350°C and cooled with the furnace. The investigation was carried out by the temperature X-ray diffraction analysis method. It is shown that in the Al-Zn system there is a peritectic transformation at ~443°C, a  $\beta$ -phase exists, of a different nature from  $\alpha$ -phase, with a break of solubility, an eutectoid decomposition  $\alpha' \rightarrow \alpha + \beta$  develops at ~340°C with the eutectoid point at ~70% Zn. There are 12 references. See also RZhMet, 1961, 11Zh132.

[Abstracter's note: Complete translation]

Z. Rogachevskaya

Card 1/1

PRESNYAKOV, A.A.; GORBAN', Yu.A.; CHERVYAKOVA, V.V. (Alma-Ata)

Phase diagram Al - Zn. Zhur.fiz.khim. 35 no.6:1289-1291 Je '61.  
(MIRA 14:7)

(Aluminum-zinc alloys)

PRESNYAKOV, A.A.; CHERVIAKOVA, V.V.; KLYUCHNIKOV, Yu.F.

X-ray investigation of hardened L75 brass during the tempering  
process. Trudy Inst. met. i obogashch. AN Kazakh. SSR 4:  
87-90 '62. (MIRA 15:8)

(Brass—Metallography)

PRESNYAKOV, A.A., CHERVYAKOVA, V.V.

TRANSACTIONS OF THE INSTITUTE OF NUCLEAR PHYSICS (TRUDY INSTITUTA  
YADERNY FIZ IKI) of the KAZAKH Academy of Sciences, Volume 2, by  
Different authors, Kazakh Academy of Science Publishing House  
ALMA-ATA, USSR, 1959. 34

On the plasticity of some alloys on an Al base

1. Plasticity and strength of Al-Cu alloys.
2. Plasticity and strength of Al-Si alloys.
3. Plasticity and strength of Al-Zn alloys.

Concerning the "Superplasticity" of alloys.

PRESNYAKOV, A.A.; CHERVYAKOVA, V.V.; NOVIKOV, A.V.; BASINA, A.N.

"Possibility of hot rolling L363-1 brass. TSvet. met. 35 no.1:  
78-80 Ja '62. (MIRA 16:7)  
(Rolling (Metalwork)) (Brass)



PRESNYAKOV, A.A.; CHERVYAKOVA, V.V.; NOVIKOV, A.V.; FRIDMAN, L.P.

Optimum procedure for the hot working of LS59-1 brass. TSvet.  
met. 35 no.8:82-83 Ag '62. (MIRA 15:8)  
(Brass) (Rolling (Metalwork))

NYSANBAYEV, G.N.; CHERVYAKOVA, V.V.

The role of lead in copper alloys. Trudy Inst. met. 1 obog. AN  
Kazakh. SSR 7:80-83 '63. (MIRA 17:6)

NYSANBAYEV, G.N.; PRESNYAKOV, A.A.; CHERVYAKOVA, V.V.

Aging of lead  $\alpha$ -brass. Trudy Inst. met. i obog. AN Kazakh.  
SSR 7:84-88 '63. (MIRA 17:6)

NYSANBAYEV, G.N.; PRESNYAKOV, A.A.; CHERVYAKOVA, V.V.

Aging of lead -brass. TSvet. met. 36 no.10:69-73 0 '63.  
(MIRA 16:12)

PRESNYAKOV, Aleksandr Aleksandrovich; SAMOYLOV, Vladimir Anatol'yevich;  
CHERVYAKOVA, Valeriya Verediktovna; GRINMAN, I.G., otv..red.;  
SHEVCHUK, T.I., red.

[Plasticity of commercial-grade alloys; reference materials]  
Plastichnost' tekhnicheskikh splavov; spravochnye materialy.  
Alma-Ata, Izd-vo AN Kaz.SSR, 1964. 219 p. (MIRA 17:6)

ACCESSION NR: AP4029708

S/0136/64/000/004/0073/0074

AUTHORS: Novikov, A.V.; Chervyakova, V.V.; Presnyakov, A.A.

TITLE: Plasticity of LS59-1-Type Brass at High Temperatures

SOURCE: Tsvetny\*ye metally\*, no. 4, 1964, 73-74

TOPIC TAGS: brass, plasticity, elongation, area reduction, deformation, micro structure, zinc, lead, nickel, alloy

ABSTRACT: The investigation of "LS59-1" brass specimens showed that after deformation and annealing, the plasticity of a cast alloy always increases resulting in a general expansion of the temperature range of deformability. Specimens contained 57.3% Cu; 0.9% Pb; 0.45% Ni; 0.18% Si; 0.22% Mn and Zn. Electrolytic "MO" type copper, "TsB" type zinc and "Cl" type lead were used as charge materials in a low-frequency induction furnace. An alloy specimen annealed after cold deformation showed a considerable increase in performance figures at 500-600C and a sharp drop in elongation within the 700 to 800C temperature range. Microanalysis showed that deformation and annealing affect the decomposition of solid solutions and that a

Cord 1/2

ACCESSION NR: AP4029708

new phase -- an intermetallic compound - forms from the additives and lead. Lead extraction and the formation of a new finely dispersed phase which is uniformly distributed in the alloy enhances the plasticity of  $\alpha+\beta$  brass at 500 to 600C. At 700-800C plasticity depends upon the intensity of diffusion processes. Evidently, in an alloy submitted to cold deformation which has a great reserve of free energy, the diffusion processes occur with a higher intensity in comparison to processes in annealed alloys. That accounts for the increased plasticity within the 700 to 850C range observed during the extension of metal submitted to cold deformation. Changes in the initial state of the alloy affects the transformation processes and may result in different changes of plasticity within the temperature range of hot deformation. The orig. art. has: 2 figures.

ASSOCIATION: None

SUBMITTED: 00

DATE ACQ: 30Apr64

ENCL: 00

SUB CODE: ML

NR REF SOV: 005

OTHER: 001

Card 2/2

NOVIKOV, A.V.; PRESNYAKOV, A.A.; CHERNYAKOVA, V.V.

Investigating the aging process in LS64-2 alloys containing silicon  
by the microhardness method. Trudy Inst. met. i obog. AN Kazakh.  
SSR 7:96-100 '63. (MIRA 17:6)



NOVIKOV, A.V.; CHERVYAKOVA, V.V.; FRIDMAN, L.P.

Effect of complex additives on the usefulness of LS59-1 brass.

Trudy Inst. met. i obog. AN Kazakh. SSR 7:101-104 '63.

(MIRA 17:6)

DUYSEMALIYEV, U.K.; NOVIKOV, A.V.; CHERVIKOVA, V.V.; FRIDMAN, L.P.

Increasing the technical and economic indices in the rolling of  
LS9-1 brass with complex additives in industrial conditions.

Trudy Inst. met. i obog. AN Kazakh. SSR 7:105-111 '63.

(MIRA 17:6)



L 45806-65  
ACCESSION NR AM4046713

TABLE OF CONTENTS [abridged]:

Introduction -- 3  
Ch. I. Methods of determining the plasticity of metals and alloys -- 4  
Ch. II. Features of the change in the plasticity of metals and alloys -- 20  
Ch. III. Iron and its alloys -- 29  
Ch. IV. Copper and its alloys -- 69  
Ch. V. Nickel and its alloys -- 132  
Ch. VI. Aluminum and its alloys -- 150  
Ch. VII. Magnesium and its alloys -- 162  
Ch. VIII. Titanium and its alloys -- 179  
Ch. IX. Tin and its alloys -- 191  
Ch. X. Lead and its alloys -- 201  
Ch. XI. Zinc and its alloys -- 206  
Bibliography -- 214

SUB CODE: MM

SUBMITTED: 03Jan64

NR REF SOV: 075

OTHER: 021

DATE ACQ: 25Jun64

Card 2/2

1.5992/64 INT(1) (TWP(1) TWP(b) ASD(d)/ASD(m)-3/SSD/AFWL/ASD(f)/RAFM(t) JD/  
ACCESSION NO. 15992/64 MJW S/0132/64/000/000 159- 1054

SOURCE: Ref. zh. Metallurgiya, Abs. 61314

AUTHOR: Novikov, A. V.; Chervyakova, V. V.

TITLE: The influence of deformation and annealing on the plasticity of brass LS59-1 at high temperatures

CITED SOURCE: Tr. In-ta metallurgii i obogashcheniya. AN KazSSR, v. 10, 1964, 3-6

TOPIC TAGS: brass, plasticity, deformation, annealing, cast alloy, hot working

TRANSLATION: In the search for methods of increasing the technological properties of LS59-1 brass during hot working of cast alloys, there was investigated the influence on their plasticity ( $\delta$ ) of the following conditions of preliminary deformation and annealing: 1) 10% work hardening; 2) 10% cold deformation plus annealing for 4 hours at 600°; 3) 10% hot deformation with subsequent 4 hour annealing at 600°. Along with determination of  $\delta$  (in the interval 20-1000°) there were conducted microstructure investigations of samples in the initial state at 20°. The magnitude  $\delta$  of the alloy LS59-1, depending on the temperature,

Card 1/2

L 6893-65

ACCESSION NR: AR4044223

changes along a complex curve with two maxima. Working under condition 1 increases  $\delta$  in the region of the 1st, and especially the 2nd, maximum and expands the temperature boundaries of the zone determined by this maximum. Here the total width of the interval of deformability (at  $\delta$  60%) does not change, but a simultaneous lowering of  $\delta$  in the region 500-600°. During condition 2,  $\delta$  gives a considerable increase in  $\delta$  at 500-600°, while in the interval of the 1st  $\delta$  of the alloy sharply drops due to disappearance of the 1st peak. This is due to the temperature dependence of  $\delta$ . Working under condition 3 lowers  $\delta$  and narrows its interval as a result of a significant decrease of  $\delta$  in the region 500-600°. During working under condition 4,  $\delta$  changes along a curve having one maximum at a temperature of ~700°. The interval of deformability of this alloy decreases due to the absence of a 2nd peak. The influence of these conditions of working on  $\delta$  of LS59-1 brass is explained by the influence of the initial state of the alloy on the development of transformations occurring in the alloy in definite temperature ranges: at 400-500°  $\beta \rightarrow \alpha$  at 600-700°  $\alpha \rightarrow \beta$ . At these temperatures there occurs a transformation in the  $\beta$ -phase.

SUB CODE: MM, ME

ENCL: 00

Card 2/2

CHERVYAKOVA, V.V.; BAIMBETOV, N.; PRESNYAKOV, A.A.

Effect of lead concentration on the plasticity of LS5G-1 brass at high temperatures. Trudy Inst. met. i obog. AN Kazakh. SSR 10:12-15 '64.  
(MIRA 18:7)

PRESNYAKOV, A.A.; CHERVYAKOVA, V.V.; POLYAKOVA, T.P.; NOVIKOV, A.V.; VOLEYNIK,  
S.N.; BAIMBETOV, N.B.

Investigating the properties of plain and lead  $\beta$ -brass. Trudy Inst.  
met. i obog. AN Kazakh. SSR 10:25-31 '64. (MIRA 18:7)



PRESNYAKOV, A.A.; CHERVYAKOVA, V.V.

The nature of transformations in 1-brass. Vest. AN Kazakh.SSR 21  
no.2:31-38. F '65. (MIRA 18:3)

BUDANOV, G.V., otv. za vypusk; REZNIKOV, A.I., otv. za vypusk;  
~~CHERYIAKOVSKIY, A.TS., red.~~; PEVZNER, A.S., red.izd-va;  
OSANKO, L.M., tekhn.red.

[Cost manual for the assembling of equipment] TSennik na montazh  
oborudovaniia. Izd.2. Moskva, Gos.izd-vo lit-ry po stroit.,  
arkhit. i stroit.materialam. No.11. [Instruments and apparatus  
for automatic checking, regulating, and control] Pribory i appara-  
tura avtomaticheskogo kontrolya, regulirovaniia i upravleniia.  
1959. 71 p. (MIRA 13:4)

1. Russia (1923- U.S.S.R.) Gosudarstvennyy komitet po delam  
stroitel'stva.

(Electric apparatus and appliances) (Automatic control)

CHERVYAKOVSKIY, A TS.

Exhibition of English instruments in Moscow. Priborostroenie no.11:  
25-27 N '60. (MIRA 13:11)

(Moscow--Exhibitions)  
(Great Britain--Instruments)

PRUSENKO, Vladimir Sidorovich; CHERVYAKOVSKIY, A.Ts., red.; VORONIN, K.P.,  
tekhn. red.

[Elements of pneumatic control for the regulation of thermal  
processes] Elementy pnevmavtomatiki dlia regulirovaniia teplo-  
vykh protsessov. Moskva, Gos. energ. izd-vo, 1961. 271 p.  
(Biblioteka po avtomatike, no.37) (MIRA 15:1)  
(Pneumatic control)

MIRONOV, Konstantin Andreyevich; SHIPETIN, Lev Iosifovich; ~~CHERVYAKOVSKIY~~,  
A.TS., inzh., retsentsent; YELISKIYEV, M.S., inzh., red.; TIKHONOV,  
A.Ya., tekhn.red.

[Automatic controllers; reference materials] Avtomaticheskie  
regulatory; spravochnye materialy. Izd.2., perer. i dop. Moskva,  
Gos.nauchno-tekhn.isd-vo mashinostroit.lit-ry, 1961. 551 p.  
(MIRA 14:6)

(Automatic control)

S/119/61/000/008/001/008  
D215/D302

AUTHOR: Chervyakovskiy, A. Ts.

TITLE: The state of development and production of actuators  
for automatic control systems

PERIODICAL: Priborostroyeniye, no. 8, 1961, 1 - 3

TEXT: The Moscow sovnarkhoz plant "Teplovoy Avtomatiki" produces electrical actuators, whose technical features and construction are suited for the requirements of electric power stations. The Chelyabinsk sovnarkhoz factory "Teplopribor" makes electric actuators designed primarily for use in the field of ferrous metallurgy. The pneumatic actuators, manufactured by Mosneftekip, Lenneftekip and others, include control valves designed basically for the petroleum industry. "Teploavtomat" in Khar'kov produces hydraulic actuators as an addition to the hydraulic controllers also produced by this plant. Combined (electric, pneumatic and hydraulic) control systems are recently becoming widely used. The factories.  
Card 1/2

The state of development ...

S/119/61/000/008/001/008  
D215/D302

however, do not put enough stress in improvements of their products and do not take into account the actual requirements of industry in installing automatic control equipment. The apparatus available on the market are designed for special rather than universal applications. Lack of standardization, unification and coordination between the scientific, research and design offices in the field of automatic instrumentation is blamed for the unsatisfactory state of affairs. The scientific research institutes have worked out schemes for electric actuators and pneumatic diaphragm motors which are given in tabulated form. The standardization and normalization design office (СКБСН)ЦНИИКА ((SKBSN)TsNIIKA) has established the pressure values of working fluid, diameters, piston stroke and dead zone. There seems to be a need for a plant capable of manufacturing low inertia single phase electric motors developing 0.6, 1.6, 4.0, 10, 25, 63, 160, 400 and 100 watts for use in actuators. There is also a demand for amplifiers for contactless control of electric actuators. There are 5 tables and 1 Soviet-bloc reference.

Card 2/2

CHERVYAKOVSKIY, A.TS.

Bases for the standardization in the manufacture of instruments.  
Priborostroenie no.9:20-22 S '61. (MIRA 14:9)  
(Instrument manufacture--Standards)



CHERVYAKOVSKIY, A.TS.

"Automatic control and controllers for industrial production processes; fundamentals of the theory" by V.M.Ordyntsev, IU.I.Shendler. Reviewed by A.TS.Cherviakovskii. Priborostroenie no.9:32 and 3 of cover. S '61. (MIRA 14:9)

(Automatic control)  
(Ordyntsev, V.M.) (Shendler, IU.I.)

DMITRIYEV Vadim Nikolayevich; CHERNYSHEV, Vladimir Ivanovich; CHERVYAKOVSKIY,  
A.TS., red.; BORUNOV, N.I., tekhn. red.

[Pneumatic analog computers] Pnevmaticheskie vychislitel'nye pri-  
bory nepreryvnogo deistviia. Moskva, Gosenergoizdat, 1962. 95 p.  
(Biblioteka po avtomatike, no.52) (MIRA 15:6)  
(Calculating machines) (Pneumatic control)

CHERVYAKOVSKIY, A.TS.

"Analysis of the performance of automatic control systems"  
by V.I. Krutov. Reviewed by A.TS. Cherviakovskii. Priborostroenie  
no.11:32, 3 of cover N '62. (MIRA 15:12)  
(Automatic control)  
(Krutov, V.I.)

PRUSENKO, Vladimir Sidorovich; CHERVYAKOVSKIY, A.Ts., red.; BUL'DYAYEV,  
N.A., tekhn. red.

[Single-circuit pneumatic control systems for thermal processes] Odnokonturnye pnevmaticheskie sistemy avtomaticheskogo regulirovaniia teplovykh protsessov. Moskva, Gosenergoizdat, 1963. 142 p. (Biblioteka po avtomatike, no.76)

(MIRA 16:8)

(Pneumatic control)

PRUSENKO, Vladimir Sidorovich; CHERVYAKOVSKIY, A.TS., red.; LARIONOV,  
G.Ye., tekhn. red.

[Multicircuit pneumatic systems for automatic control of  
thermal processes] Mnogokonturnye pnevmaticheskie sistemy  
avtomaticheskogo regulirovaniia teplovykh protsessov. Mo-  
skva, Gosenergoizdat, 1963. 127 p. (Biblioteka po avtoma-  
tike, no.77) (MIRA 16:11)

(Pneumatic control)

PRUSENKO, Vladimir Sidorovich; CHERVYAKOVSKIY, A.TS., red.

[Pneumatic transducers and secondary devices] Pnevmaticheskie datchiki i vtorichnye pribory. 2., perer. i dop. izd. Moskva, Energiia, 1965. 192 p. (Biblioteka po avtomatike, no.125) (MIRA 18:4)

CHERVYAKOVSKIY, G. F.

Chervyakovskiy, G. F. "Synthetic production of minerals typical of bornite containing ore of pyrite deposits," Trudy Gorno-geol. in-ta (Akad. nauk SSSR, Ural'skiy filial), Issue 14, 1948, p. 91-92

SO: U-3850, 16 June 53, (Letopis 'Zhurnal 'nykh Statey, No. 5, 1949).

CHERVYAKOVSKIY, G.F.  
CA

8

Stronoveite and native silver. G. F. Chervyakovskiy  
Zapiski Vostocnoy. Mineral. (Ishkimbai) (Ishkimbai, USSR  
mineral.), 80, 75(1961).-- Stronoveite is remarkable in  
the bornite (Cu ore) deposits of the mine "3d International";  
it is easily identified by its strong pleochroism and bire-  
fringence, with brown and blue-violet colors in the polished  
section. The mineral replaced chalcocite and tetrahedrite  
Native Ag is observed as a metamorphic mineral, intergrown  
in quartz, in typical dendrites. W. Ficht

1951



CHERVYAKOVSKIY, G. F.

USSR,

Mineralogical alteration of ores in exo-contact porphyries in deposits of International III. G. F. Chervyakovskiy. *Trudy Gorno-Geol. Inst. Akad. Nauk S.S.S.R., Ural. Filial* No. 20, *Minerolog. Sbornik* No. 2, 53-8 (1953).—C. concluded that the magnetite in the pyritic deposits appears to be of metamorphic formation. The presence of magnetite in the Cu pyrite ore not only near the dike of porphyrite, but also near the metamorphic green schists, contg. a considerable quantity of carbonate, leads to the idea that formation of magnetite proceeded as a result of interaction of ores with the surrounding rock.

Gladys S. Macy

**CHERVYAKOVSKIY, G.F.**

**Folding and shearing stages in the Urals. Dokl. AN SSSR 105 no.4:  
808-811 D '55. (MLRA 9:3)**

**1. Gorno-geologicheskii institut Ural'skogo filiala Akademii  
nauk SSSR. Predstavleno akademikom D.V. Malivkinym.  
(Ural Mountains--Folds (Geology))**

CHERVYAKOVSKIY, G.F.

Mineralogical characteristics of certain pyrite deposits in the  
northern part of the Central Urals. Trudy Gor.-geol.inst.UFAN  
SSSR no.33:141-159 '59. (MIRA 13:4)  
(Ural Mountains--Pyrites)

CHERVYAKOVSKIY, G.F.

Stratigraphy and tectonics of the greenstone band in the  
lower Tagil Valley. Trudy Gor.-geol.inst.UFAN SSSR no.33:  
297-300 '59. (MIRA 13:4)  
(Tagil Valley--Greenstone)

**CHERVYAKOVSKIY, G.F.; GOVOROVA, A.V.**

**Biotite containing monchiquites from the Krasnoural'sk region in  
the Central Urals. Zap. Vses. min. ob-va 88 no.5:597-599 '59.  
(MIRA 13:2)**

**1.Gorno-geologicheskii institut Ural'skogo filiala AN SSSR.  
(Krasnoural'sk region--Monchiquites)**

CHERVYAKOVSKIY, G.F.

Sericitization processes in the greenstone belt of the Central Urals.  
Trudy Gor.-geol. inst. UFAN SSSR no.43:93-107 '59. (MIRA 13:11)  
(Ural Mountains--Cericite)  
(Ural Mountains--Greenstone)

CHERVYAKOVSKIY, G.F.

Classification of pyrite deposits of the Urals. Trudy Gor.-geol. inst.  
UFAN SSSR no.40:113-120 '59. (MIRA 13:11)  
(Ural Mountains--Pyrites)

CHERVYAKOVSKIY, G.F.

Enclosures and detritus of quartzo-sericitic schists in massive  
copper pyrite ores of some deposits in the Central Urals. Trudy  
Gor.-geol. inst. UFAI SSSR no.43:175-179 '59. (MIRA 13:11)  
(Ural Mountains--Pyrites) (Schists)



CHERVYAKOVSKIY, G.F.

Certain problems relative to the study of the effusive volcanism in  
the Urals. *Izvestiya Akademii Nauk SSSR, Seriya Geologicheskaya* 35 no.4:134 J1-Ag '60.  
(MIRA 14:4)

(Ural Mountains--Rocks, Igneous)

CHERVYAKOVSKIY, G.F.

Substitution of chalcopryite by bornite with the formation of  
lattice structures. Trudy Gor.-geol. inst. UFAN SSSR no. 35:119-  
122 '60.

(Chalcopryite)

(Bornite)

(MIRA 14:1)

CHERVYAKOVSKIY, G.F.

Ignimbrites and tuff lavas in the Urals. Trudy Lab. vulk.  
no.20:161-164 '61. (MIRA 14:11)

1. Gornogeologicheskiiy institut Ural'skogo filiala AN SSSR.  
(Ural Mountains—Volcanic ash, tuff, etc.)

CHERVYAKOVSKIY, G.F.

New associations of hypogenic nonmetalliferous minerals in ores  
of pyrite deposits in the Central Urals. Trudy Gor.-geol.inst.  
UFAN SSSR no.56:91-97 '61. (MIRA 15:7)  
(Ural Mountains--Minerals)

CHERVYAKOVSKIY, G.F.

Some regularities in the location of pyrite deposits in the Urals.  
Trudy Gor.-geol.inst. UPAN SSSR no.58:155-168 '62. (MIRA 15:12)  
(Ural Mountains--Pyrites)

CHERVYAKOVSKIY, G.F.

Types of pyrite deposits in the Ural Mountains and the characteristics  
of their distribution. Zakonom.rab.polezn.iskop. 7:378-380 '64.  
(MIRA 17:6)

1. Institut geologii Ural'skogo filiala AN SSSR.

CHIRVYAKOVSKIY, G.F.; KOROTEYEV, V.A.

Lithology, structure, and stratigraphy of the Irelyk series.  
Dokl. AN SSSR 157 no.4:863-865 Ag '64 (MIRA 17:8)

1. Institut geologii Ural'skogo filiala AN SSSR. Predstavleno  
akademikom N.M. Strakhovym.

CHERVENKOV, I.Y., C.F.

Volcanic structures in the volcanic zones of the Ural.  
Dokl. AN SSSR 159 no.1:89-91 N '64. (MLR 17:12)

I. Institut geologii Ural'skogo filiala AN SSSR. Predstavleno  
akademikom D.S. Korzhanskim.



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Etiological factors of acute catarrhs of the respiratory tract  
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eff. of hypothermia & inhalation of cold air in animals (Rus))

(HYPOTHERMIA, effects,

on resp. tract in animals (Rus))

(COLD, effects,

inhalation of cold air, on resp. tract in animals (Rus))

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Role of the cooling factor in the pathogenesis of the acute  
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1. Kafedra propedevtiki vnutrennikh bolezney No.2 (nachal'nik  
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(COLD--PHYSIOLOGICAL EFFECT)

**CHERVYAKOVSKIY, N.Ya., prof. (Leningrad)**

On the significance of viscerovisceral reflexes in the clinical picture of internal diseases. Klin.med. 37 no.9:85-91 S '59.

(MIRA 12:12)

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Stable tachycardia as an early symptom in tumors of the  
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L 04806-67

ACC NR: AP6027254 (N) SOURCE CODE: UR/0177/66/000/007/0064/0066

AUTHOR: Bobrov, N. I.; Chervyakovskiy, N. Ya.

ORG: none

TITLE: Body function shifts of sailors sailing in the Arctic

SOURCE: Voenno-meditsinskiy zhurnal, no. 7, 1966, 64-66

TOPIC TAGS: arctic medicine, human physiology, physiologic parameter, blood, nutrition

ABSTRACT: The effect of Arctic conditions on body functions of sailors aboard a small vessel were investigated during a 90 day expedition. Psychomotor reflexes, arterial pressure, lung capacity, capillary resistance, and blood proteins served as indices which were determined before the expedition, at bases, at sea and at end of voyage. Findings show that after 90 days at sea the psychomotor reflex to a light flash is retarded in most cases indicating a certain degree of fatigue. Initial maximal arterial pressure values of some crew members were increased due to nervous tension, but became normalized at sea and remained normal; thus, the mean maximal arterial pressure values were lower at the end of 90 days than the initial values. The minimal

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arterial pressure values did not change significantly at any period. Electrocardiographic data also showed no significant shifts. But, blood protein values were reduced to their lowest normal range values by the 90th day. Urea levels were determined daily to study protein metabolism in greater detail. Urea levels were highest during stormy weather (up to 40 g) and lowest during stopovers at bases (9.71 g). Thus, increased urea levels are the result of more intense protein metabolism leading to reduced blood protein levels. Capillary resistance tests displayed no evidence of a vitamin C deficiency. The only recommendation made for future expeditions of this type is to provide a higher protein diet. Orig. art. has: 3 tables.

SUB CODE: 06/ SUBM DATE: none

Card 2/2 *gd*